GEOGRAPHIC SCHOOL BULLETINS

THE NATIONAL GEOGRAPHIC SOCIETY, WASHINGTON 6, D.C.

VOLUME 37, NUMBER 24, APRIL 6, 1959 . . . *To Know This World, Its Life*

► St. Lawrence Seaway Links Great Lakes to World
► Fifty Years Ago—Peary Conquers the Pole
► Learning to Live in Nature's Deepfreeze
► Oklahoma Builds a Cowboy Hall of Fame

FLAGS FLAP from a pulpwood boat to salute opening of St. Lawrence Seaway locks

ANDREW H. BROWN, NATIONAL GEOGRAPHIC STAFF

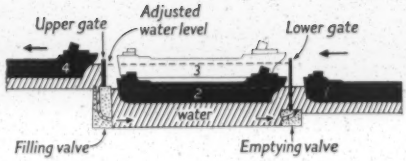
UMI

A Detroit car maker need no longer load Europe-bound autos on railroad cars, only to reload them on freighters at Atlantic ports. Now the cars can sail non-stop to the other side of the world.

Navigation on the St. Lawrence has been a problem for two-and-a-half centuries. In three spots between the Great Lakes and the tidewater below Montreal, the big, broad river narrows and gushes over jagged rocks. At the International Rapids section, hidden boulders and 15-foot-high waves stopped all but shallow-draft excursion craft which shot the rapids for thrills. One 19th century visitor said he would prefer crossing the Atlantic Ocean three times to traveling the St. Lawrence rapids.

French priests and fur traders about 1700 solved the problem for their freight canoes by building a ditchlike canal around Lachine Rapids near Montreal. In 1834 engineers began a nine-foot-deep bypass of the International Rapids section. At the turn of the century it was deepened to 14 feet.

By 1908 Canada had constructed a series of locks and canals from Montreal to Lake Ontario, allowing the passage of small ships.

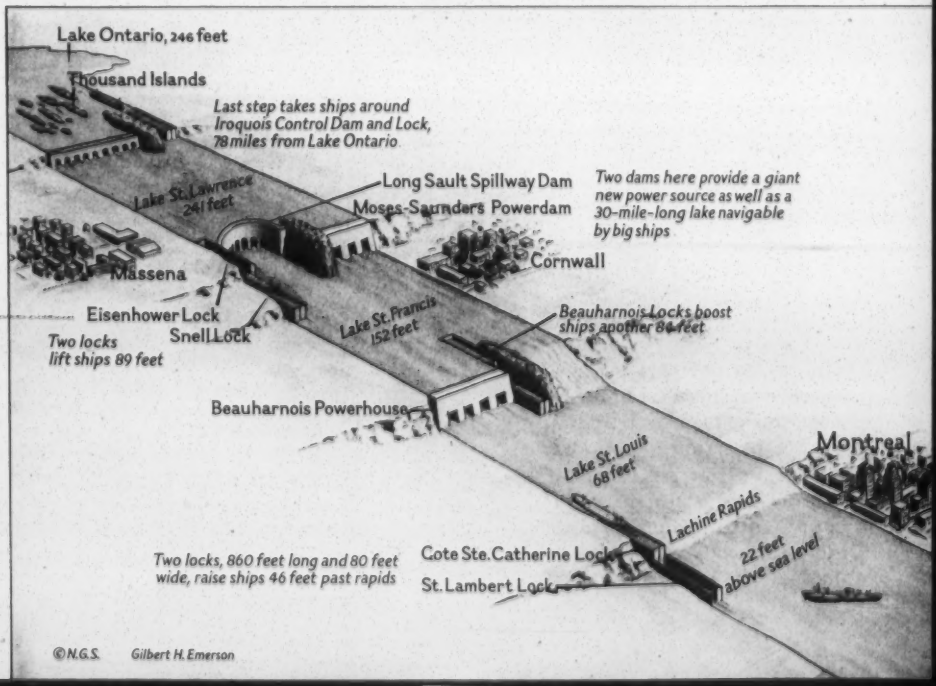


LOCK OPERATION: A canal lock is simply a water stairway. Vessel enters lock (1) from lower level and (2), is lifted by water entering through filling valve. When ship reaches upper level (3), upper gate opens, and the vessel steams out of the lock (4).

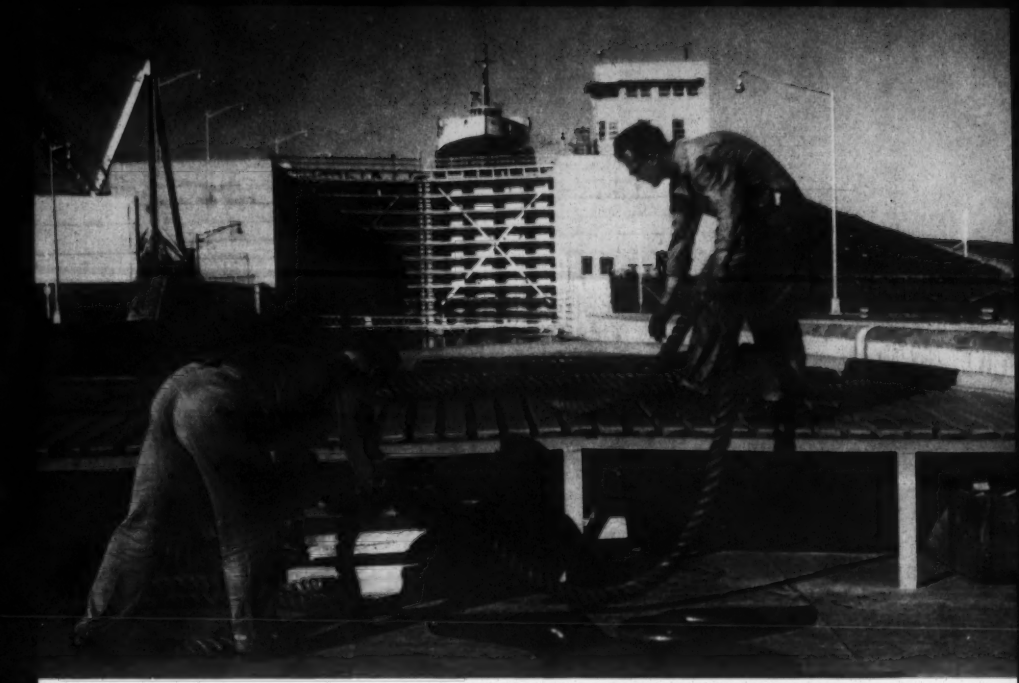
Even earlier, Canada and the United States had talked about developing the river for power and navigation, but the conferences dragged on for decades without tangible results. Finally in 1954 the two countries became Seaway partners.

Engineers scrapped the old series of 22 shallow locks and substituted seven large ones which lift ships the required 224 feet on an even stairway between Montreal and Lake Ontario. This escalator of locks (see foreshortened drawing below) cost $470,000,000. The all-Canadian Welland Canal, opened in 1932, bypasses Niagara Falls.

Two spanking new locks, each about


Lake Ontario, 246 feet
Thousand Islands
Last step takes ships around Iroquois Control Dam and Lock, 78 miles from Lake Ontario
Lake St. Lawrence 246 feet
Long Sault Spillway Dam
Moses-Saunders Powerdam
Two dams here provide a giant new power source as well as a 30-mile-long lake navigable by big ships
Cornwall
Massena
Eisenhower Lock
Snell Lock
Two locks lift ships 89 feet
Lake St. Francis 152 feet
Beauharnois Locks boost ships another 82 feet
Beauharnois Powerhouse
Montreal
Lake St. Louis 68 feet
Lachine Rapids
22 feet above sea level
Two locks, 860 feet long and 80 feet wide, raise ships 46 feet past rapids
Cote Ste. Catherine Lock
St. Lambert Lock
©N.G.S. Gilbert H. Emerson

UMI



NATIONAL GEOGRAPHIC PHOTOGRAPHER ROBERT F. SISSON

THE SEAWAY Reshapes World Geography

THE *C-R-R-R-ACK* OF SPLITTING ice in the St. Lawrence River this month signals the start of a geographic revolution. As spring burgeons along the United States-Canada border, the first big ocean-going ship will be able to steam into the heart of North America by means of giant locks such as the one above.

In its first season of operation, the St. Lawrence Seaway will change the face of the continent and alter the trade patterns of the world.

On June 26, Queen Elizabeth II and Prince Philip of England, Canadian Prime Minister John G. Diefenbaker, and United States President Eisenhower plan to meet at Montreal to dedicate this latest and biggest American-Canadian joint project, a superhighway for ships between the Great Lakes and the Atlantic Ocean.

For four years men and machines pushed and shoved the mighty St. Lawrence River around. They uprooted villages, blasted and cut canyons through tons of earth and rock. They raised bridges without seriously interrupting traffic. They pumped rapids dry and dredged out mountains of river bed.

Completion of their work will add 8,300 miles to the North American coastline, more miles than the total United States Atlantic seaboard. The new water turnpike will link such midwestern cities as Duluth, Detroit, and Chicago to the ports of the world. Hamburg will be closer to Cleveland than to Baltimore.

The Seaway means that ocean freighters no longer will have to stop at Montreal and transfer cargo to small lakers for passage inland. About 80 per cent of the world's ships will be able to steam in and out of the Great Lakes almost as easily as they now enter Chesapeake Bay or Puget Sound.

GEOGRAPHIC SCHOOL BULLETINS, copyright © 1959 by the National Geographic Society, Melville Bell Grosvenor, President. Published weekly during school months by the School Service Division, Ralph Gray, Chief. Assts.: Arthur P. Miller, Jr., Frank Sartwell, Katherine Crapster, Liva Baker. Entered as second class matter, Wash., D.C. International copyright. All rights reserved. Rates: United States, $2.00 for 30 issues (one school year); Canada, $2.25; elsewhere, $2.50. U. S. only, three years (90 issues) for $5.00. The National Geographic Society is a nonprofit educational and scientific society established for the increase and diffusion of geographic knowledge.

Industries in and around Massena, New York, will use half the United States share of the power. Most of this will go into making aluminum, which requires 10,000 watts per pound. Some United States power will go as far as the Mohawk Valley and Vermont. The Canadian share will serve southern and eastern Ontario.

Seven whole Canadian villages plus part of another had to be relocated to make way for 38,000-acre Lake St. Lawrence. In all, 6,500 people, 525 homes, and even graveyards were moved.

During construction, the United States and Canada channeled more than $1,000,000,000 into the combined St. Lawrence Seaway and Power Projects. At peak effort, 22,000 men and $70,000,000 worth of machines worked on it.

One of the biggest stumbling blocks to building the Seaway was weather. In winter temperatures touched 25 degrees below zero.

Temperatures dropped so low that workers' bare hands stuck to tools. Gears stiffened. Concrete froze before it could set. Earth and gravel froze to truck beds.

In spite of these obstacles, the Seaway will be open to big ships this month. Impact on the surrounding communities is expected to be great. Change will not come suddenly, but easy access to world shipping and abundant electric power make it inevitable.

Seaway traffic, 13,000,000 tons in 1957, is expected to increase to 25,000,000 tons this year and to 50,000,000 tons by 1968.

Montreal is preparing for a trade boom, although many of the ships which now stop there will pass her by when the Seaway opens. Canada's National Harbours Board is spending $57,000,000 to improve the port.

Chicago is investing $37,500,000 to improve port facilities. Milwaukee, Cleveland, and Detroit also have embarked on waterfront projects.

The Seaway changes the geography of North America. A wild river lies tame and obedient to man's bidding. Cities closer to the Great Plains and the Rockies than to the eastern seaboard become Atlantic ports-of-call. The United States and Canada open their own Mediterranean and ships line up (below) to enter its man-made Straits of Gilbraltar. L.B.

ANDREW H. BROWN, NATIONAL GEOGRAPHIC STAFF

UMI

NATIONAL GEOGRAPHIC PHOTOGRAPHER W. D. VAUGHN

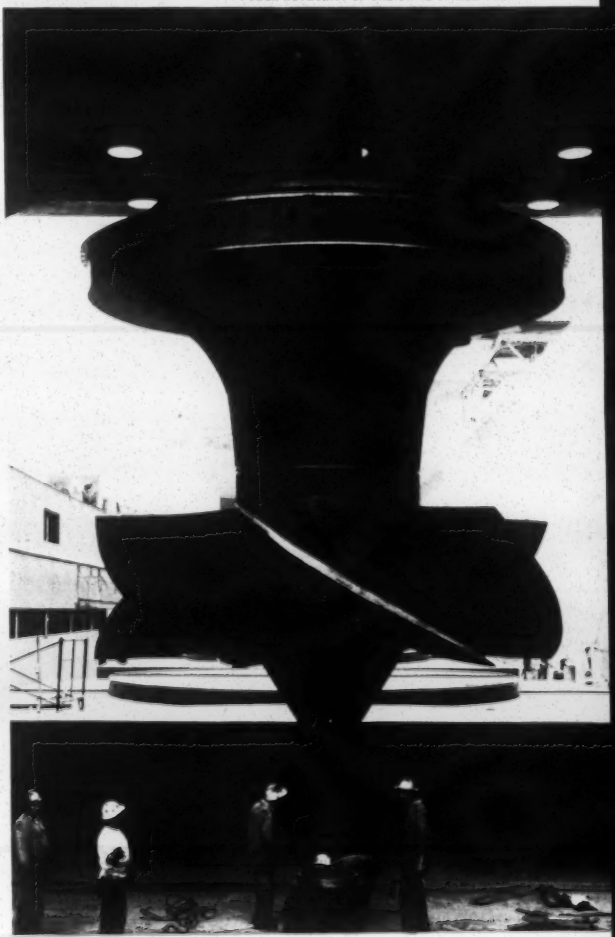
900 feet long, 80 feet wide and with a 30-foot minimum depth, now lift ships from the 22 feet above sea level of Montreal over the Lachine Rapids to a level of 68 feet. Two more locks, 20 miles upstream at Beauharnois, again boost ships, this time 84 feet, to the level of Lake St. Francis. Thirty-five miles farther, two more locks, named for President Eisenhower and Congressman Bertrand H. Snell, lift the ships another 89 feet into man-made Lake St. Lawrence, which now hides what were once the wildest rapids in the river. Seventy-eight miles from Lake Ontario, the last lock in the Seaway system lifts the ships the last five feet, and the freighters steam free into Lake Ontario. The whole trip takes about 30 hours.

Through this series of locks and canals, the products of interior United States and Canada —coal, oil, lumber, paper, farm machinery, automobiles, farm products—can move efficiently and cheaply to overseas markets. Above, wheat from Canada's Plains streams into a barge. Iron ore from the rich Quebec-Labrador fields will sail nonstop to midwest steel centers.

At two points along the Seaway, the locks bypass power projects: the Beauharnois Powerhouse, the Long Sault Spillway Dam and the Moses-Saunders Powerdam. The Iroquois Control Dam regulates the spillage of water into Lake St. Lawrence.

Mighty turbines such as the one being installed at right already wring out power for the two nations, which split the river equally. More "water wheels" will be installed as the project is completed.

POWER AUTHORITY OF THE STATE OF NEW YORK



FASCINATED by the frozen Sahara, Peary made his first expedition to the Arctic in 1886, exploring southern Greenland (not shown on map). From then until 1909 he devoted his energies to the secrets of the Far North until he reached the ultimate mystery, the North Pole itself. After its conquest, he never again returned to the Arctic.

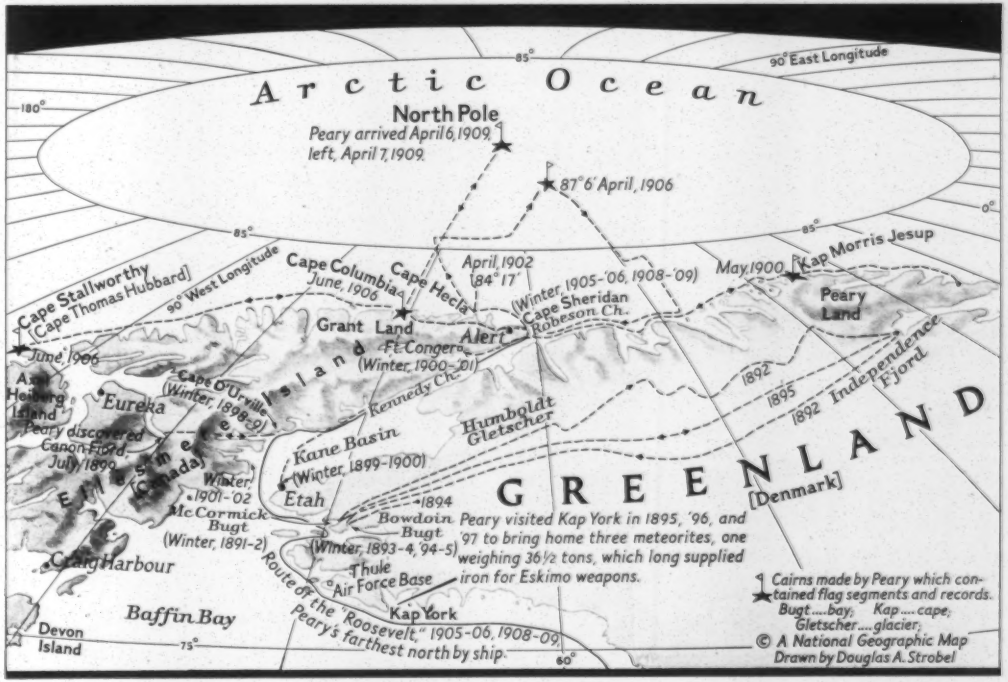
Peary's career in exploration may be traced on this map, and in his own words in the issues of *The National Geographic Magazine*, with which he was associated even before the North called him.

The first volume of the Magazine, in 1889, carried an article by the 33-year-old naval engineer. It described a journey "Across Nicaragua with Transit and Machete."

Later The National Geographic Society and its members gave financial support to the Peary Arctic expeditions drawn at right.

Speaking of the Pole, then believed by many to be unreachable, Peary said in an address to the Society in 1902:

"Each time we have come a little nearer, each time we have learned a little more, and I say to you here tonight that it is not an impossibility that it can be done." He already knew who was the man to do it.



WHEREVER HE TREKKED in the Arctic, Peary carried, wrapped around his body, an American flag handsewn by his wife. At significant points he built stone cairns and deposited pieces of the banner—marked on the map by black stars and small pennants.

At the North Pole he left a slash that cut across the field of stars and the lower band of stripes. This has never been recovered. Segments left at Cape Columbia and Cape Thomas Hubbard were found by later explorers. The flag itself, bearing its honorable scars, was given by the Peary family to The National Geographic Society, and rests at its Washington, D. C. headquarters. F.S.

PEARY— First and Last to Reach North Pole Afoot

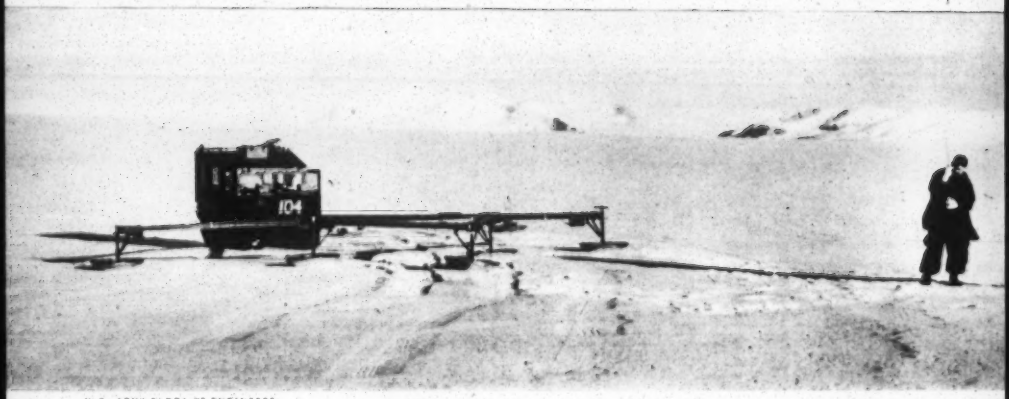
FIFTY YEARS ago today, the determination that stares from this face carried Admiral Robert Edwin Peary, U.S.N., to a triumph no man tasted before—or since.

With five companions—four Eskimos and a Negro—Peary walked to the North Pole across the broken and treacherous ice of the Arctic. After a thousand miles of tough sledding, he could report "Stars and Stripes nailed to the Pole."

His belt tightened three notches from its usual girth, sleeping only a few hours at a time, Peary led his band steadily northward until there was no longer any northward. Sun sightings showed that all directions were south, and Peary wrote in his journal, "The Pole at last!"

ADMIRAL ROBERT E. PEARY

NO TRIUMPH shows on this face, yet the man was triumphant. Safely back at base after the heroic dash to the Pole, Admiral Peary shows lines of fatigue and tension around his eyes like sled tracks in the snow. At right, an icy wall, like hundreds he had to cross, holds up the party while men and dogs struggle to push sleds over the top. Sometimes supplies had to be taken off and carried by hand to get the sleds over such "pressure ridges," caused by ice floes grinding together. Nearer the Pole, the ice was fortunately fairly smooth.



U.S. ARMY CORPS OF ENGINEERS

tells us the temperature, pressure, and humidity. By tracking the balloon's path with the antenna on the building, our men inside plot wind speed and direction."

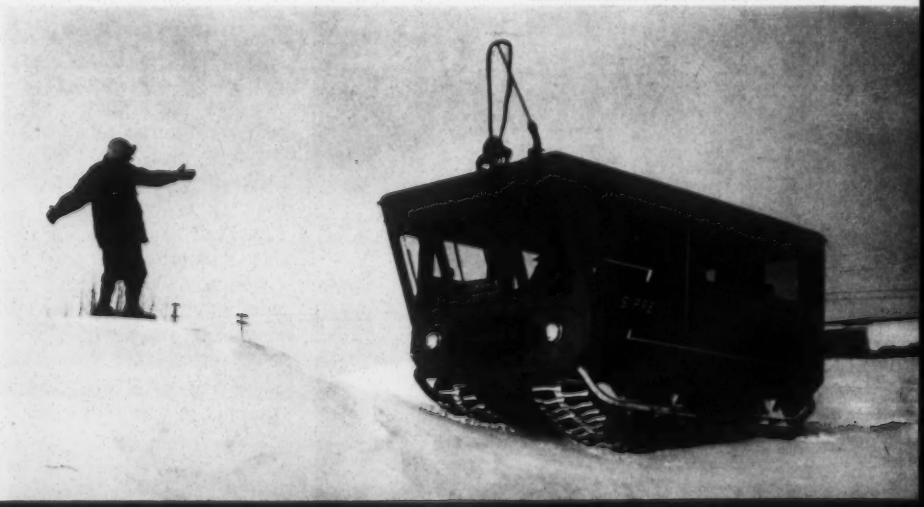
But even if meteorologists predict fair weather, Army engineers find Greenland's icecap a forbidding place to do business. To make it possible to set up research camps around the icecap, polar experts at Houghton and elsewhere have played midwife at the birth of a whole family of vehicles that would startle Admiral Peary.

"Since 1950 there has been a revolution in over-snow transportation," Captain Fred E. Wiederhold told me as we climbed into a Muskeg snow tractor (bottom of page). Although the temperature hovered around 20 below, the cabin was comfortably heated.

As we jounced off across a snow field, he explained this particular model was Canadian. "But it's similar to our Weasel," he said. "The Weasel is our workhorse up in Greenland. Pulls snow trains carrying men and equipment. Even serves as an ambulance if we need one. This Muskeg is being used to help evaluate new types that are coming along."

I soon learned that the No. 1 hazard to man or tractor on the icecap is the crevasse, or ice fracture. A proud achievement of the Army Engineer Corps is the development of an electronic crevasse detector (above). A Weasel pushes six aluminum dish-shaped plates before it over the snow. Electronic impulses flash downward from the dishes, bouncing back with information on what lies below. When his apparatus detects a weak spot, the operator backs off and hops out with a long probing rod. With his Bunyan-size toothpick he determines the shape of the crevasse and decides whether the "snow bridge" that covers it will support the following snow train. If not, detonation men will blast out the cavity. Like

ARTHUR P. MILLER, JR., NATIONAL GEOGRAPHIC STAFF



UMI

ARTHUR P. MILLER, JR., NATIONAL GEOGRAPHIC STAFF

Learning to Live in the Arctic

By Arthur P. Miller, Jr., Geographic School Bulletins Staff

ONCE WHEN the ice pack stretched smooth and unbroken before Peary and his band, an Eskimo declared: "The devil must be asleep."

The devil of the north is not usually caught napping, even today. Men of the Army Corps of Engineers who venture out on the Greenland Icecap every summer find that wind-whipped snow still stings the face, whiteouts draw a curtain across the horizon, crevasses yawn beneath the feet.

But if man cannot lull the devil to sleep, he can at least outwit him.

I had a chance to investigate some of the Army's ways of doing just that when the *Geographic School Bulletins* sent me to the Engineers' polar research station at Houghton, Michigan. Here on the Upper Peninsula, some 200 inches of snow a year build a miniature Arctic.

At wintry Houghton, and in supporting laboratories to the south at Wilmette, Illinois, scientists work on tranquillizers for Old Man Arctic. When Michigan finally thaws, the scientists pack their parkas and follow the snow to Greenland to put their winter experiments to the test.

At Houghton I met William Parrott, veteran geologist who is in charge of the Snow, Ice, and Permafrost Research Station.

"Explorers like Peary learned to survive in the Arctic," Bill Parrott said. "We want to learn how to live and work there.

"The first thing we need to understand is weather. Peary took the weather as he found it; we try to anticipate it. That's not easy because weather in Greenland is subject to wild variations. Temperatures at our main base at Thule average 15 degrees warmer than on the rim of the icecap, scarcely 15 miles away.

"But come watch our Signal Corps boys let a balloon go." We crunched over near two soldiers standing beside a concrete-block building.

"This is how we get vital information about weather aloft." One man lifted the big plastic balloon over his head and let it go. As the wind whipped it out of reach, the second soldier released a white box hung from the balloon.

"The box contains instruments and a small radio transmitter," Parrott said. "As the balloon ascends, the transmitter

New Honors for Sons of the Old West

THERE WILL BE NO Mavericks, Marshal Dillons, Bat Mastersons, or Wyatt Earps in the National Cowboy Hall of Fame near Oklahoma City. Scheduled to open next year, this museum pays homage to another kind of Westerner:

- One who made homespun philosophy part of American folklore.
- One who took Western virtues of honesty and courage to the White House.
- One who turned his knowledge of the West into brilliant showmanship.
- One who put the beauty of the West on canvas.

Such men as Will Rogers, Theodore Roosevelt, William F. "Buffalo Bill" Cody, and painter Charles Russell (see back cover) stand several notches above the gunslingers often portrayed on television and in the movies.

They gave much to the West and never took a life in a showdown gunfight.

Will Rogers (right) has become an American trademark. Born on an Oklahoma ranch, he learned to ride soon after taking his first step. A cowpoke during much of his youth, he wandered off to South America and South Africa to seek his fortune. In South Africa he got a job as a trick roper in a "Wild West" show, and his career on the stage was born. He returned to the United States, went on to the Ziegfeld Follies and Hollywood. But he never forgot his western roots. As a humorist, he took to the sophisticated East the western grass-roots humor of warmth and down-to-earth horse sense.

OKLAHOMA CITY CHAMBER OF COMMERCE

Theodore Roosevelt was not a native-born Westerner. He went west for his health, eventually buying a ranch in the Dakota Territory. But he acquired more than physical stamina. He gained, too, the moral convictions that sustained him as he later rose in public life to America's highest office. On camping and buffalo-hunting trips, he learned to love the area, of which he wrote in his book "Winning of the West." And when he went to the White House, he remembered his western days. He sponsored range conservation laws and the Reclamation Act, which provided for irrigation of arid western land.

"Buffalo Bill" Cody rode the pony express as a teen-ager. He was later an army scout, cattleman, and buffalo hunter. The story goes that he was such a skilled horseman and marksman that—to save hauling—he often chased bison to the cook tent before shooting them. Cody transformed the excitement of his rich and varied experiences into the famous thrillers of the time, the "Wild West" shows.

These then, are to the West the true cowboys. These and others from 17 western states will be honored with places in the futuristic building atop a hill outside Oklahoma City. There are spots for Kit Carson, pioneer scout and trail blazer; Stephen F. Austin, father of Texas; Brigham Young, colonizer of Utah; James J. Hill who laced the West with railroads; Charles Goodnight, blazer of cattle trails from Texas to the Rockies. There will be places for those who built ranch empires, pioneered in cattle breeding, advanced the cause of the West as statesmen, or glorified the West in print. L.B.

UMI

a dentist filling a tooth, bulldozers will pack it full of snow.

Not all research produces immediate applications. Take ice coring, for example. I watched a glaciologist like this one extracting a cylinder of ice from the side of an ice tunnel under the Greenland Icecap. He "read" the ice core like a forester reads tree rings. Such cores can tell the climatic history of the world. From particles frozen in the ice layers scientists can date a big volcanic eruption, the start of the industrial age, the year radioactive fallout became a factor.

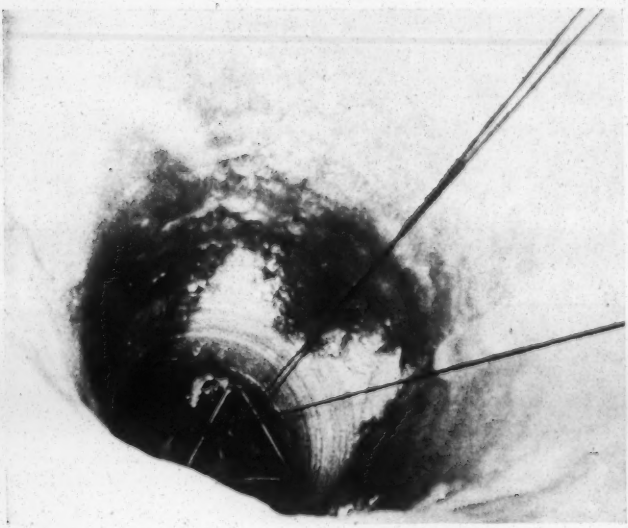
PHOTOGRAPHS BY U.S. ARMY CORPS OF ENGINEERS

On the other hand, a new-type igloo is eminently practical, as Robert Waterhouse demonstrated. Finely ground snow blown over a geodesic dome quickly hardens like cement. "In a few hours," he said, "you simply dig a tunnel into the igloo, unbolt the aluminum framework, peel off the nylon skin, and pull everything out through the door."

Bob Waterhouse gave me a few hints where all this busy research could conceivably lead. Already, he said, Army Engineers have proved men can live almost comfortably on the icecap, guide themselves across its wastes, keep themselves and their machines supplied, melt their own water, and preserve food in natural refrigerators.

They can, and have, built airfields out of compacted snow. Stretch the imagination just a bit, he said, and you can picture aircraft nestling in under-ice hangers, refueling from storage tanks carved out of the ice, taking off down white runways.

Admiral Peary would never recognize his Arctic.



THIRTEEN HUNDRED feet into the Greenland Icecap goes this four-foot augur hole, drilled by Army Engineers in 1957. A glaciologist appears at the top of the shaft, pulled up from an inspection in a boatswain's chair. Drilled near the icecap's edge, the four-foot hole disclosed facts about ice melt and movement that helped construction men build a ramp to the top of the cap.

THE HISTORICAL SOCIETY OF MONTANA

RUSSELL'S BRUSH CAPTURES SPIRIT OF COWBOY LIFE

A THUNDER OF HOOVES, the lariat settling over the horns, a dead-sudden stop, and the luckless "Herd Quitter" is tumbling for gumbo. The West lives on in such paintings by Charles M. Russell. The Montana artist, already honored in museums and galleries, will have a prominent place in the National Cowboy Hall of Fame. His studio was a log cabin; his subjects, the panorama of the raw West, his Indian friends, and the bucking bronc. But he was more than a chronicler. A cowboy himself, he understood the West and put in his paintings all its violence, sadness, and humor.

UMI